

Reassignment of the genus *Thalassobathia* from Bythitidae to Ophidiidae (Teleostei, Ophidiiformes) based on the first reported males

by

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RÉSUMÉ. - Réassignation du genre *Thalassobathia* des Bythitidae aux Ophidiidae (Ophidiiformes) fondée sur les premiers spécimens mâles observés.

Le genre *Thalassobathia* Cohen, 1963 de l'ordre des Ophidiiformes avait été placé dans le groupe des genres vivipares d'ophidioides (Cohen, 1963), et ultérieurement dans la famille des Bythitidae par Cohen et Nielsen (1978). Les 30 spécimens connus à ce jour étaient identifiés comme des femelles, des immatures ou bien de sexe indéterminé. Cependant, l'étude histologique des gonades de deux de ces spécimens (235 et 270 mm LS) a montré que tous les deux étaient des mâles. Les caractères diagnostiques des Bythitidae vivipares, c'est-à-dire la présence d'un capuchon génital et d'un organe copulateur, sont absents chez ces spécimens; de ce fait, nous proposons de replacer le genre *Thalassobathia* dans la famille ovipare des Ophidiidae.

Key words. - Ophidiidae - *Thalassobathia* - Reassignment.

The order Ophidiiformes is characterized by having 0-2 rays in each pelvic fin inserted at about level of opercle or farther anteriorly and placed close together; dorsal and anal fins with long bases, extending to and often joined with caudal fin; all fin rays soft; dorsal and anal pterygiophores more numerous than adjacent vertebrae; paired nostrils on each side of head (Nielsen *et al.*, 1999). The genus *Thalassobathia* was described by Cohen (1963) who referred it to the "ophidioids" which corresponds to the order Ophidiiformes in Cohen and Nielsen (1978). It shows many specializations such as a very thick skin, almost completely lacking scales, pelvic fins diverging from each other and covered with thick, fleshy skin and much reduced gill rakers, all characters which make it difficult to determine its relationships. However, Cohen found that *Thalassobathia* was closest related to the *Bythites-Oligopus-Cataetys* group, which was later placed within the viviparous family Bythitidae by Cohen and Nielsen (1978). Since then it has been treated as a bythitid genus by all ichthyologists. *Thalassobathia pelagica* has a remarkable biology as it lives pelagically at depths between 350 and 2000 m apparently in close association with the large scyphomedusan jellyfish *Stygiomedusa* sp. (Harbison *et al.*, 1973; Drazen and Robinson 2004). Two species were described, the type species *T. pelagica* Cohen, 1963 from the Atlantic Ocean and *T. nelsoni* Lee, 1974 from off Chile. A specimen from the Bering Sea was reported upon by Balanov and Fedorov (1996), who noted that it differed from both *Thalassobathia* species, but they refrained from describing a new species based on only one specimen. However, Prokofiev and Kukuev (2008) compared the specimen from the Bering Sea with material of both *Thalassobathia* species and found

that it belonged to *T. pelagica*.

One of the reasons for placing *Thalassobathia* in the viviparous family Bythitidae was the presence of what Cohen (1963) described as "a broad, fleshy hood over the genital area" which is typical for males in the subfamily Bythitinae. However, the present study shows that what is found in *Thalassobathia* is a thickening of the tissue around the anal opening (Fig. 2) and not a hood protecting the genital opening. Until recently the 30 specimens reported in the literature were identified as females, immature or unsexed but no males. The apparent lack of males is due to the assumption that *Thalassobathia* is a bythitid genus and as such should have been provided with a mail genital hood.

MATERIAL AND METHODS

Material examined. - BMNH 1967.11.8.1 (SL 235 mm, male), off Donegal Bay, Ireland, fishing vessel, 17 Feb. 1963. - MCZ 98388 (2 spms, SL 198 mm, female, SL 192 mm, sex unknown), North Atlantic, 49°57'N, 33°21'W, R/V Chain, st. 105, pelagic trawl, 700-800 m, 1 Jul. 1972. - ZMH 101225 (SL 235 mm, sex unknown), off South Greenland, 60°10'N, 47°6'W, R/V Friedrich Heincke, 350 m, 30 Mar. 1961. - ZMH 112441 (SL 165 mm, female), Central North Atlantic, 7°55'N, 32°41'W, R/V 'Anton Dohrn', 0-2000 m, 21 Jul. 1974. - ZMH 120789 (2 spms, SL 210 mm, female, SL 270 mm, male), off Spain, 45°12'N, 13°26'W, R/V 'Walther Herwig', st. 331/82, pelagic trawl, 0-1800 m, 5 Jun. 1982. - ZMUC P77442 (SL 260 mm, female), off Congo, 5°7'S, 11°14'E, R/V 'Ombango', 950-980 m, 3 May 1963. - ZMUC P77731 (SL 255 mm, female), North Atlantic, 49°48'N, 25°55'W, R/V 'Walther Herwig', 392/82, pelagic trawl, 0-1000 m, 16 Jun. 1982. - ZMUC P77853 (SL 270 mm, female), off East Greenland, 66°5'N, 30°15'W, R/V 'Tasiilaq', 18 Apr. 1991.

The histological examination of the gonads of the two specimens (BMNH 1967.11.8.1 and ZMH 120789) was based on 7-µm paraffin sections, stained with hematoxylin and eosin.

Institutional abbreviations follow Eschmeyer (1998).

RESULTS AND DISCUSSION

In the search for males of *Thalassobathia* we have examined the gonads of ten specimens. Six had well-developed ovaries and in four the gonads looked differently. A histological examination of the four showed unidentifiable gonadal tissue in two and typical testis tissue with stages of spermatogenesis (Fig. 3) in two (ZMH 120789, 210 mm SL and BMNH 1967.11.8.1, 235 mm SL). These

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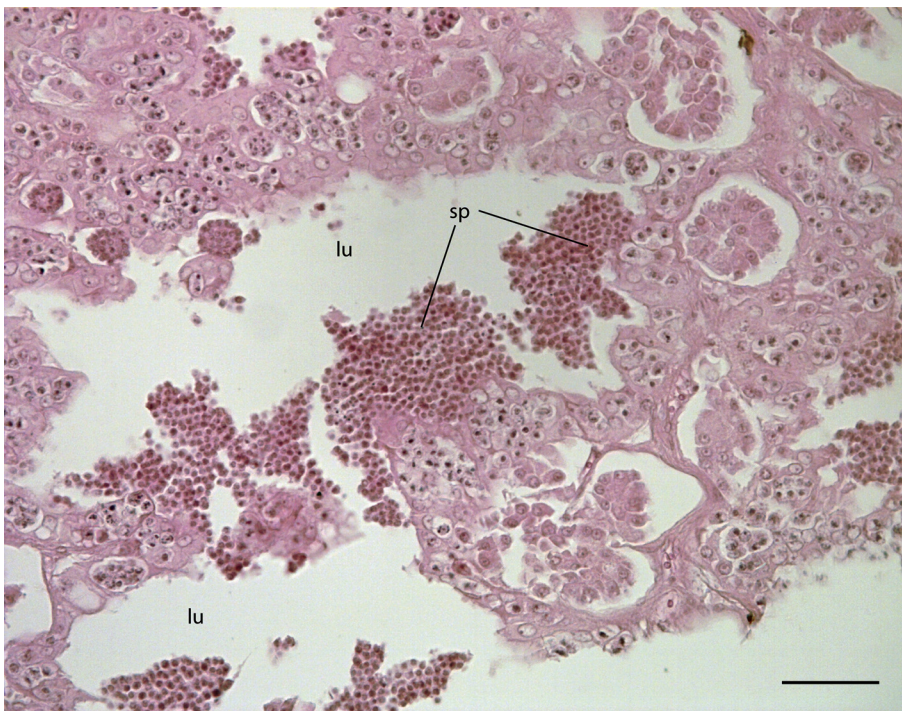
Figure 1. - *Thalassobathia pelagica*, ZMH 120789, SL 270 mm, ♂. (Nikolas Ioannou photo).



Figure 2. - Anal area of *Thalassobathia pelagica*, ZMH 120789, SL 270 mm, ♂. Scale bar = 2.5 cm. (Nikolas Ioannou photo).



Figure 3. - Testis of *Thalassobathia pelagica*, ZMH 120789. Paraffin section showing spermatogenic developmental stages, including free spermatocytes (sp) in the lumen (lu). Hematoxylin and eosin. Scale bar = 50 μ m.



are the first reported *Thalassobathia* males and in none of the two specimens a genital hood or intromittent organ was observed. Except for *Calamopteryx goslinei* Böhlke & Cohen, 1966 spermatophores were found in all 12 viviparous ophidioids examined by Nielsen *et al.* (1968). A spermatophore is a capsule holding bundles of fully developed spermatozoans and since spermatozoans were not observed in the two male *Thalassobathia*, spermatophores were not to be expected. Spermatophores are not observed in any species of the oviparous Ophidiidae.

We propose that the genus *Thalassobathia* should be removed from the viviparous family Bythitidae and placed in the oviparous family Ophidiidae based on the fact that males lack a genital hood and an intromittent organ.

This reassignment does not require modifications in the diagnosis of the Ophidiidae (sensu Nielsen *et al.*, 1999). The diagnosis of the Bythitidae becomes stricter after the removal of *Thalassobathia*, as this family now only holds species with one ray in each pelvic fin (Nielsen *et al.*, 1999).

The phylogeny of the ophidiidae is not clear yet, but Nielsen *et al.* (1999) recognized four subfamilies: *Thalassobathia* does clearly not fit the Brotulinae (barbels absent vs present), the Ophidiinae (pelvic fins placed below gill openings vs pelvic fins placed below eyes) or the Brotulotaeniinae (scales normal vs modified). Currently, *Thalassobathia* is therefore placed in the subfamily Neobythitinae. This subfamily is most probably not monophyletic and needs further study. *Thalassobathia* has some superficial similarity to *Benthocometes*, *Petrotyx* and *Ventichthys* (Nielsen *et al.*, 2006) in i.e., blunt snout, no free pectoral fin rays and granular teeth, but differs from all in lacking basibranchial tooth patches and by having thick-skinned pelvic fins and much reduced gill rakers on anterior arch. The phylogenetic position within Ophidiidae is still unknown, and awaits further studies.

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